Characteristics of Mustard (Blister) Agents

The Program Executive Office, Assembled Chemical Weapons Alternatives, known as PEO ACWA, is responsible for the safe and environmentally compliant destruction of the chemical weapons stockpiles stored at the Pueblo Chemical Depot in Colorado and the Blue Grass Army Depot in Kentucky. Currently, the program is building state-of-the-art pilot plants that will safely and efficiently destroy these chemical weapons stockpiles.

The safe, secure storage of these remaining chemical weapons in the U.S. Army inventory is the responsibility of the U.S. Army Chemical Materials Activity.

The Pueblo stockpile consists of 2,611 tons of mustard agent in projectiles and mortar rounds, and the Blue Grass stockpile is comprised of 523 tons of nerve and blister agents stored in rockets and projectiles.

What is mustard (blister) agent?

Mustard (blister) agent, purified sulfur mustard or distilled mustard, has a 5 percent sulfur impurity, less odor and greater blistering power than the original mustard agent used in World War I. Mustard agent is also known as H, HD or HT.

Agent H contains about 20-30 percent impurities and HD is a nearly pure substance. HT is a mixture of 60 percent HD and 40 percent of another substance called T. In its pure liquid state, mustard agent is colorless. However, when exposed to impurities, it becomes a pale yellow to brown oily substance. Mustard agent freezes at 58° F, is liquid at any temperature above 58° F, boils (becomes a vapor with a garlic-like odor) at 419° F and can remain active in the soil for at least three years.

Exposure to mustard agent causes inflammation of the eyes, nose, throat, trachea, bronchi, and lung tissue and blisters the skin. In amounts approaching the lethal dose, injury to bone marrow, lymph nodes and spleen may occur. Mustard agent is toxic and the International Agency for Research on Cancer has deemed it a carcinogen (cancer-causing agent).

Where is mustard agent stored?

A stockpile of projectiles containing mustard agent (H) is stored at the Blue Grass Army Depot, Ky. At the Pueblo Chemical Depot, Colo., the stockpile consists of mortar rounds and projectiles containing mustard agent (HD and HT).

As a signatory to the Chemical Weapons Convention, the United States has destroyed nearly 90 percent of its original chemical weapons stockpile, which was successfully completed by the U.S. Army Chemical Materials Activity in January 2012. The remaining stockpiles in Blue Grass and Pueblo represent the 10 percent for which PEO ACWA is responsible.

Chemical weapons or bulk containers holding mustard agent have been previously destroyed at Johnston Atoll, a group of islands about 800 miles southwest of Hawaii; Edgewood, Md.; Pine Bluff, Ark.; Anniston, Ala.; Umatilla, Ore.; and Tooele, Utah.

Are mustard agents harmful?

It would take an accident such as an explosion or fire in order for the public to be exposed to mustard agent from the Army's chemical weapons stockpile. In a fire, most of the agent would burn up, but some would stay in the smoke. Emergency officials call this smoky cloud and the invisible parts around it a plume.

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If an accident occurred, a plume would drift away from the scene, and small drops of the blister agent might fall to the ground. These liquid drops would be harmful if they make contact with the skin or if contaminated food or drink is consumed.

Some tiny parts of the mustard agent, called vapor, would remain in the plume. Vapor inhalation is harmful. Because the vapor would travel farther from the accident, it would be the greater danger over a large area. Invisible mustard vapors would expand beyond any visible smoke, and the faint garlic-like odor of mustard would not be a trustworthy sign of a hazard because lower levels of vapor, which are odorless, can be harmful. However, the vapor becomes less harmful the farther the plume travels as it mixes with clean air. The clean air dilutes the agent until it is no longer harmful.

To better understand a mustard exposure, one can use the following analogy. Like mustard, perfume in a bottle is liquid. If sprayed on someone, the perfume drops will cling to skin, hair and clothes. If sprayed on the other side of the room, the aerosol drops would not come in contact with skin or clothing, but the fragrance is detectable. The fragrance is the vapor.

What are the signs of exposure?

Symptoms of mustard exposure may not appear for up to two to 24 hours. Symptoms may include redness and stinging of the eyes or skin, followed by skin blisters, burning of the nose and sinuses, sore throat and hoarseness or coughing. The severity of exposure depends on how much mustard is in the vapor and the length of time of exposure.

Avoiding the mustard vapor should always be the primary goal. However, anyone with symptoms of mustard exposure should call for medical help immediately and follow those instructions. Anyone who suspects mustard exposure should take the following steps:

- If in a sealed shelter, take off outer clothing, put them in a plastic bag and seal the bag.
- If water is available in the shelter, take a cool to warm (not hot) shower, using lots of soap and water. Keep soap out of eyes; just use lots of water on the eyes.
- Do not ventilate or leave the sealed shelter until told to do so. Anyone who does leave the area should tell emergency responders or medical staff about any possible mustard exposure.
- Tell emergency responders about the sealed bag so that they can arrange for its safe removal after the emergency.